REMARKS

The Office Action mailed April 5, 2002, has been received and reviewed. Claims 1 through 53 are currently pending in the application. Claims 1 through 27 and 29 through 53 stand rejected. The Office Action Summary shows claim 28 as "objected to," but the body of the Office Action does not state a basis for such objection or whether claim 28 includes allowable subject matter. Clarification is respectfully requested. Applicants have amended the claims herein, and respectfully request reconsideration of the application.

Information Disclosure Statement

Applicants note the filing of an Information Disclosure Statement herein on February 13, 2002 and note that no copy of the PTO-1449 was returned with the outstanding Office Action. Applicants respectfully request that the information cited on the PTO-1449 be made of record herein.

Objection to Disclosure

The disclosure was objected to because it erroneously referred to the parent application as "abandoned." The disclosure has been amended herein to show the correct status of the parent application.

35 U.S.C. § 112 Claim Rejections

Claims 3 through 6, 30 through 33, and 52 stand rejected under 35 U.S.C. § 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Applicants respectfully traverse this rejection, as hereinafter set forth.

Claims 3 through 5 and 30 through 32 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. Applicants respectfully traverse this rejection, as hereinafter set forth.

Specifically, it was stated that the specification failed to teach how one manipulates the surface tension of the adhesive. Similarly, it was stated that the specification failed to teach how one manipulates the difference in pressure within the adhesive material and ambient air. Applicants respectfully submit that the specification discloses manipulation of the surface tension and the difference in pressure within the adhesive material and ambient air, for example, at pages 13-14 paragraphs 48, 59 and 50. Further, it was stated that the specification failed to teach that the at least one mechanism comprises at least one of a coating stencil, a vacuum and a height detection mechanism. Applicants submit that these elements are disclosed in the specification at least, for example, on pages 13-14 paragraphs 45 through 50. Reconsideration and withdrawal of the rejection is requested.

It was also stated that the specification failed to teach how the height detection system taken alone levels the exposed surface of the adhesive. Applicants respectfully submit that the specification states with respect to FIGs. 11 & 12, "[a] height detection mechanism, shown as a light (preferably a laser) transmitter 140 and a light receiver 142 is used to determine the height of the exposed surface 122. The control signal 144 from control system 200 triggers the pump 132 to stop or a valve (not shown) to shut when the desired exposed surface height is achieved." (*See*, Specification, page 13, paragraph 46).

Claims 5 and 32 were rejected for failing to further limit the structure of the apparatus. Applicants have amended claims 5 and 32 to recite the " mechanism is configured to use [uses] the surface tension of the viscous material to control surface area and thickness of the viscous material available for application to said at least one semiconductor component". Reconsideration and withdrawal of the rejection is requested.

37 CFR § 1.75(c) Claim Objections

Claims 7 through 20 stand objected to under 37 CFR § 1.75(c) as being of improper dependent form for failing to further limit the subject matter of a previous claim. Claim 1 has been amended to recite "at least one mechanism associated with said adhesive reservoir, said at least one mechanism configured to level said exposed surface of adhesive material and maintain said exposed

surface of adhesive material at a substantially constant height". Accordingly, applicants submit that claim 7 as presently amended further limits claim 1 by recited the coating stencil apertures as sized and configured to define an area of the exposed surface of the adhesive material while claim 1 refers to the leveling and height of the exposed surface of adhesive material. Reconsideration and withdrawal of the objection is requested.

Claim 2 was objected to for inclusion of the element "meniscus". Applicants have amended claim 2 to further limit the recitations of claim 1. Reconsideration and withdrawal of the rejection is requested.

35 U.S.C. § 103(a) Obviousness Rejections

Obviousness Rejection Based on U.S. Patent 5,275,661 to Nakagawa et al.

Claims 1 through 6, 22, 25, and 26 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Nakagawa et al. (U.S. Patent 5,275,661). Applicants respectfully traverse this rejection, as hereinafter set forth.

M.P.E.P. 706.02(j) sets forth the standard for a Section 103(a) rejection:

> To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or combine reference teachings. Second, there must be a reasonable expectation of success. Finally, **the prior art reference (or references when combined) must teach or suggest all the claim limitations.** The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). (Emphasis added).

Nakagawa discloses a dipping apparatus adapted to apply electrodes onto end portions of chip type electronic components. (FIG. 1). A body houses a dipping vessel 7 containing electrode paste. A conveyor system 5, 6 moves holding plates A including a plurality of electronic components B across the top of the dipping vessel 7. A diphead portion 2 is mounted above the dipping vessel 7 and conveyor system 5, 6 and includes a moveable chucking portion 10. (FIG. 1).

B

The blade member 76 of the recovery blade 72 is pressed against the bottom surface of the dipping vessel 7 and the blade supporting frame 71 is moved left. (Nagakawa, FIG. 14a; col. 7, lines 53-55). This action pushes electrode paste into a pile. The recovery blade 72 is then moved upwardly and a leveling blade 73 (positioned left of the electrode paste pile) is moved toward the bottom of the dipping vessel 7. (FIG. 14b). The leveling blade 73 is moved to the right to contact the left side of the electrode paste pile thus forming a thin pile of electrode paste on the bottom of the dipping vessel 7. (FIG. 14c). Then, portions of electronic components B that project through the holding plate A are pressed into the electrode paste piles and against the bottom of the dipping vessel 7. (Nagakawa, col. 8, lines 9-23).

By way of contrast with Nakagawa, independent claim 1 of the presently claimed invention recites an apparatus for applying adhesive material to only one or more underside surfaces of at least one semiconductor component, comprising an adhesive reservoir configured to provide an exposed surface of adhesive material to only a defined portion of each of one or more underside surfaces of at least one semiconductor component positioned thereover, said adhesive reservoir comprising at least one pool chamber defined by at least one upward facing opening, said adhesive reservoir shaped such that the exposed surface of adhesive material is supplied to a precise location above said at least one upward facing opening, said adhesive material having a surface tension; and at least one mechanism associated with said adhesive reservoir, said at least one mechanism configured to level said exposed surface of adhesive material above said at least one upward facing opening and maintain said exposed surface of adhesive material at a substantially constant height.

Applicants respectfully submit that Nakagawa fails to teach or suggest every element of claim 1 of the presently claimed invention. Nakagawa fails to teach or suggest an adhesive reservoir configured to provide an exposed surface of adhesive material to only a defined portion of each of one or more underside surfaces of at least one semiconductor component positioned thereover, said adhesive reservoir shaped such that the exposed surface of adhesive material is supplied to a precise location above at least one upward facing opening, and at least one mechanism associated with said adhesive reservoir configured to level said exposed surface of adhesive material above said at least one upward facing opening and maintain said exposed surface of adhesive material at a substantially

constant height. Instead, Nakagawa discloses a dipping vessel configured to accumulate piles of electrode paste on a bottom surface thereof such that an electronic component to be contacted with the electrode paste must, of necessity, enter the dipping vessel to contact the bottom surface of the dipping vessel to receive electrode paste. Notably,

Further, Nakagawa discloses blades 72, 73 configured to level a pile of electrode paste *within* the dipping vessel and against the bottom surface thereof. (FIGs. 14a-c). As shown in FIGs. 14 a-c, the blades are not configured to either level the exposed surface of the electrode paste above an at least one upward facing opening or maintain a height of the electrode paste pile above an at least one upward facing opening. As Nakagawa fails to teach or suggest every element of claim 1 of the presently claimed invention, Nakagawa does not render independent claim 1 of the presently claimed invention obvious.

Claims 2 through 6, 22, 25 and 26 are each allowable as depending, either directly or indirectly, from allowable claim 1.

Claim 3 is further allowable as Nakagawa fails to teach or suggest that the at least one mechanism is configured to manipulate the surface tension of the adhesive material to flatten the exposed surface of said adhesive material. Instead, Nakagawa only teaches that the blade system presses against the sides of the electrode paste piles and, at best, blade 73 levels the electrode paste mechanically, using a squeegee effect.

Claim 4 is further allowable as Nakagawa fails to teach or suggest that the at least one mechanism is configured to manipulate the difference in pressure within said adhesive material and ambient air to be equal to twice the surface tension of said adhesive material divided by a radius of curvature of the adhesive material. Instead, Nakagawa only teaches that the blade system presses against the sides of the electrode paste piles and, again, blade 73 mechanically squeegees the pile of paste.

Claim 5 is further allowable as Nakagawa fails to teach or suggest that the at least one mechanism is configured to use the surface tension of the adhesive material to control surface area and thickness of the adhesive material available for application to said at least one semiconductor component.

Obviousness Rejection Based on U.S. Patent 5,185,040 to Sakai et al.

Claims 1 through 27 and 29 through 53 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Sakai et al. (U.S. Patent 5,185,040). Applicants respectfully traverse this rejection, as hereinafter set forth.

Sakai discloses an electrode paste reservoir 4 having a slotted plate 3 wherein electrode paste 2f is forced upwardly through slits 3a and introduced to at least three surfaces of an electronic component 1 having an end surface 1a and major surfaces 1b and 1c which are in series with end surface 1a. (Sakai, FIG. 3). When end surface 1a and associated major surfaces, 1b and 1c, are introduced to electrode solder paste 2f, that has been forced through slits 3a, a U-shaped electrode is formed on end surface 1a and associated major, or side, surfaces 1b and 1c. (Sakai, FIG. 5).

By way of contrast with Sakai, claim 1 of the presently claimed invention recites an apparatus for applying adhesive material to only one or more underside surfaces of at least one semiconductor component, comprising an adhesive reservoir configured to provide an exposed surface of adhesive material to only a defined portion of each of one or more underside surfaces of at least one semiconductor component positioned thereover, said adhesive reservoir comprising at least one pool chamber defined by at least one upward facing opening, said adhesive reservoir shaped such that the exposed surface of adhesive material is supplied to a precise location above said at least one upward facing opening, said adhesive material having a surface tension; and at least one mechanism associated with said adhesive reservoir, said at least one mechanism configured to level said exposed surface of adhesive material above said at least one upward facing opening and maintain said exposed surface of adhesive material at a substantially constant height.

Applicants respectfully submit that Sakai fails to teach or suggest an apparatus for applying adhesive material to only one or more underside surfaces of at least one semiconductor component, comprising an adhesive reservoir configured to provide an exposed surface of adhesive material to only a defined portion of each of one or more underside surfaces of at least one semiconductor component positioned thereover. Instead, the Sakai apparatus is designed to apply electrode paste to both the bottom surface and adjacent sides of an electronic component. While Sakai implies that one may form electrodes only on a bottom surface of an electronic component, it is noted that there

b

is no enabling disclosure for doing same. Moreover, Sakai fails to provide any mechanism for *leveling* an exposed surface of his electrode paste, or *maintaining* a height thereof. As Sakai fails to teach or suggest every element of claim 1 of the presently claimed invention, applicants submit that claim 1 avoids Sakai. As such, claim 1 is allowable.

Claims 2 through 26 are each allowable as depending, either directly or indirectly, from allowable claim 1.

Claim 3 is further allowable as Sakai fails to teach or suggest that the at least one recited mechanism is configured to manipulate the surface tension of an adhesive material to flatten the exposed surface of the adhesive material.

Claim 4 is further allowable as Sakai fails to teach or suggest that the at least recited one mechanism is configured to manipulate the difference in pressure within an adhesive material and ambient air to be equal to twice the surface tension of the adhesive material divided by a radius of curvature of the adhesive material.

Claim 5 is further allowable as Sakai fails to teach or suggest that the at least one recited mechanism is configured to use the surface tension of an adhesive material to control surface area and thickness of the adhesive material available for application to said at least one semiconductor component.

Claim 7 is further allowable as Sakai fails to teach or suggest that the at least one recited mechanism comprises a coating stencil including a generally flat and generally horizontal top surface; and a plurality of apertures aligned to wet said defined portion of said at least one semiconductor component with an adhesive material, said plurality of apertures sized and configured to control extrusion of the adhesive material through said coating stencil to increase the exposed surface of the adhesive material.

Claim 11 is further allowable as Sakai fails to teach or suggest that the plurality of apertures of a coating stencil be positioned substantially parallel to each other and is spaced so as to have a centerline pitch between each aperture of said plurality of apertures of .020 inches (.051 cm).

Claim 12 is further allowable as Sakai fails to teach or suggest that the plurality of apertures of a coating stencil number 23 in quantity.

B

Claim 13 is further allowable as Sakai fails to teach or suggest that the plurality of apertures of the coating stencil be .260 inches (.660 cm) in length and is .010 inches (.025 cm) in width.

Claim 14 is further allowable as Sakai fails to teach or suggest that the plurality of apertures of the coating stencil be sized and configured as a result of considering adhesive material viscosity.

Claim 15 is further allowable as Sakai fails to teach or suggest that the plurality of apertures of the coating stencil be sized and configured to suit an adhesive material viscosity ranging from approximately 1000 to 500,000 centipoise.

Claim 16 is further allowable as Sakai fails to teach or suggest that the plurality of apertures of a coating stencil be sized and configured to optimally accommodate an adhesive material viscosity of approximately 62,000 centipoise.

Claim 17 is further allowable as Sakai fails to teach or suggest that the plurality of apertures of a coating stencil be sized and configured to optimally accommodate an adhesive material viscosity of approximately 62,000 centipoise at a temperature of approximately 77° F (25 °C).

Claim 18 is further allowable as Sakai fails to teach or suggest that the plurality of apertures of a coating stencil be arranged generally parallel to each other and be spaced so as to have a centerline pitch between each aperture of said plurality of apertures of .020 inches (.051 cm).

Claim 19 is further allowable as Sakai fails to teach or suggest that the plurality of apertures of a coating stencil number 23 in quantity.

Claim 20 is further allowable as Sakai fails to teach or suggest that the plurality of apertures of a coating stencil is .260 inches (.660 cm) in length and is .010 inches (.025 cm) in width.

Claim 22 is further allowable as Sakai fails to teach or suggest that the at least one second mechanism be configured to bring a defined portion of at least one semiconductor component in contact with an exposed surface of adhesive material.

Claim 23 is further allowable as Sakai fails to teach or suggest that the adhesive reservoir further comprises an adhesive circulation mechanism configured to circulate an adhesive material and maintain uniformity of the adhesive material.

Claim 24 is further allowable as Sakai fails to teach or suggest that the at least one mechanism include a pump configured to supply an adhesive material to an adhesive reservoir and

b

a control system to control a supply of adhesive material to the adhesive reservoir to control extrusion of the adhesive material to a selectable height.

Independent claim 27 is allowable for substantially the same reasons as claim 1. Claim 27 of the presently claimed invention recites an apparatus for applying viscous material to one or more underside surfaces of at least one semiconductor component, comprising a reservoir for providing an exposed surface of viscous material to only one or more underside surfaces of at least a portion of at least one semiconductor component positioned thereover, said reservoir comprising at least one pool chamber in fluid communication with a viscous inflow chamber, said at least one pool chamber defined by at least one upward facing opening, said reservoir shaped such that the exposed surface of viscous material is supplied to a precise location above said at least one upward facing opening, said viscous material having a surface tension; at least one first mechanism configured to provide said viscous material to a desired selectable height above said at least one upward facing opening; and at least one second mechanism associated with said reservoir, said at least one second mechanism configured to level said exposed surface of viscous material above said at least one upward facing opening, to maintain said exposed surface of viscous material at a substantially constant height and to increase the effective exposed surface of viscous material.

Applicants respectfully submit that Sakai fails to teach or suggest an apparatus for applying viscous material to one or more underside surfaces of at least one semiconductor component, comprising a reservoir for providing an exposed surface of viscous material to only one or more underside surfaces of at least a portion of at least one semiconductor component positioned thereover. Instead, the Sakai apparatus is designed, as noted above, to apply electrode paste to a plurality of sides of an electronic component and lacks any enabling disclosure of applying electrode paste to only a bottom surface of an electronic component.

Further, Sakai fails to teach or suggest at least one first mechanism configured to provide said viscous material to a desired selectable height above said at least one upward facing opening; *and* at least one second mechanism associated with said reservoir, said at least one second mechanism configured to *level* said exposed surface of viscous material above said at least one upward facing opening, to *maintain* said exposed surface of viscous material at a substantially constant height and

to increase the effective exposed surface of viscous material. Instead, Sakai only discloses a coating stencil 3 for controlling extrusion of electrode paste. As Sakai fails to teach or suggest every element of claim 27 of the presently claimed invention, applicants submit that claim 27 avoids Sakai. As such, claim 27 of the presently claimed invention is allowable.

Claims 28 through 53 are each allowable as depending, either directly or indirectly, from allowable claim 1.

Claim 28 is further allowable as Sakai fails to teach or suggest a control system for controlling supply of a viscous material to a reservoir.

Claim 30 is further allowable as Sakai fails to teach or suggest at least one second mechanism configured to manipulate surface tension of a viscous material to flatten out the exposed surface of the viscous material.

Claim 31 is further allowable as Sakai fails to teach or suggest at least one second mechanism configured to manipulate the difference in pressure within a viscous material and ambient air to be equal to twice the surface tension of the viscous material divided by a radius of curvature of the viscous material.

Claim 32 is further allowable as Sakai fails to teach or suggest at least one second mechanism configured to use surface tension of a viscous material to control surface area and thickness of the viscous material available for application to at least one semiconductor component.

Claim 39 is further allowable as Sakai fails to teach or suggest a plurality of openings of at least one coating stencil be positioned generally parallel to each other and is spaced so as to have a centerline pitch between each opening of the plurality of openings of .020 inches (.051 cm).

Claim 40 is further allowable as Sakai fails to teach or suggest a plurality of openings of at least one coating stencil number 23 in quantity.

Claim 41 is further allowable as Sakai fails to teach or suggest a plurality of openings of at least one coating stencil be .260 inches (.660 cm) in length and is .010 inches (.025 cm) in width.

Claim 42 is further allowable as Sakai fails to teach or suggest a plurality of openings of at least one coating stencil be sized and configured as a result of considering viscous material viscosity.

B

Claim 43 is further allowable as Sakai fails to teach or suggest a plurality of openings of at least one coating stencil be sized and configured to manage a viscous material viscosity ranging from approximately 1000 to 500,000 centipoise.

Claim 44 is further allowable as Sakai fails to teach or suggest a plurality of openings of at least one coating stencil be sized and configured to optimally accommodate a viscous material viscosity of approximately 62,000 centipoise.

Claim 45 is further allowable as Sakai fails to teach or suggest a plurality of openings of at least one coating stencil be sized and configured to optimally accommodate a viscous material viscosity of approximately 62,000 centipoise at a temperature of approximately 77° F (25 °C).

Claim 46 is further allowable as Sakai fails to teach or suggest a plurality of openings of at least one coating stencil be arranged generally parallel to each other and be spaced so as to have a centerline pitch between each opening of said plurality of openings of .020 inches (.051 cm).

Claim 47 is further allowable as Sakai fails to teach or suggest a plurality of openings of at least one coating stencil number 23 in quantity.

Claim 48 is further allowable as Sakai fails to teach or suggest a plurality of openings of at least one coating stencil be .260 inches (.660 cm) in length and is .010 inches (.025 cm) in width.

Claim 50 is further allowable as Sakai fails to teach or suggest at least one third mechanism configured to bring at least one semiconductor component in contact with an exposed surface of viscous material.

Claim 51 is further allowable as Sakai fails to teach or suggest a circulation mechanism configured to circulate a viscous material and maintain uniformity of the viscous material.

CONCLUSION

Claims 1 through 53 are believed to be in condition for allowance, and an early notice thereof is respectfully solicited. Should the Examiner determine that additional issues remain which might be resolved by a telephone conference, he is respectfully invited to contact Applicants' undersigned attorney.

Respectfully Submitted,

Joseph A. Walkowski
Registration Number 28,765
Attorney for Applicants
TRASKBRITT, PC
P.O. Box 2550
Salt Lake City, Utah 84110
Telephone: (801) 532-1922

JAW/ps:dlm
Date: July 5, 2002
Enclosure: Version With Markings to Show Changes Made

N:\2269\3161.3\Amendment.wpd

B

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE SPECIFICATION

[0001] Cross-Reference to Related Application: This application is a continuation of application Serial No. 08/906,578, filed August 5, 1997, now [abandoned] U.S. Patent 6,336,973.

IN THE CLAIMS

1. (Amended twice) An apparatus for applying adhesive material to one or more underside surfaces of at least one semiconductor component, comprising:

an adhesive reservoir configured to provide [for providing] an exposed surface of adhesive material to only a defined portion of each of one or more underside surfaces of at least one semiconductor component positioned thereover, said adhesive reservoir comprising at least one pool chamber defined by at least one upward facing opening, said adhesive reservoir shaped such that the exposed surface of adhesive material is supplied to a precise location above said at least one upward facing opening, said adhesive material having a surface tension; and

at least one mechanism associated with said adhesive reservoir, said at least one mechanism configured to level said exposed surface of adhesive material at said precise location above said at least one upward facing opening and maintain said exposed surface of adhesive material at a substantially constant [level] height.

2. (Amended) The apparatus of claim 1, wherein said at least one upward facing opening, in combination with said surface tension of said adhesive material, is configured to provide an exposed surface [comprises] comprising a meniscus.

5. (Amended) The apparatus of claim 1, wherein said at least one mechanism is configured to use [uses] the surface tension of the adhesive material to control surface area and thickness of the adhesive material available for application to said at least one semiconductor component.

7. (Twice Amended) The apparatus of claim 1, wherein said at least one mechanism comprises a coating stencil including:

a generally flat and generally horizontal top surface; and

a plurality of apertures aligned to wet said defined portion of said at least one semiconductor

component with said adhesive material, said plurality of apertures sized and configured to control extrusion of said adhesive material through said coating stencil to [increase] define an area of the exposed surface of said adhesive material.

27. (Amended twice) An apparatus for applying viscous material to one or more underside surfaces of at least one semiconductor component, comprising:

a reservoir for providing an exposed surface of viscous material to only one or more underside surfaces of at least a portion of at least one semiconductor component positioned thereover, said reservoir comprising at least one pool chamber in fluid communication with a viscous inflow chamber, said at least one pool chamber defined by at least one upward facing opening, said reservoir shaped such that the exposed surface of viscous material is supplied to a precise location above said at least one upward facing opening, [and] said viscous material having a surface tension;

at least one first mechanism configured to provide said viscous material to a desired selectable height above said at least one [pool chamber] upward facing opening; and

at least one second mechanism associated with said reservoir, said at least one second mechanism configured to level said exposed surface of viscous material above said at least one upward facing opening, to maintain said exposed surface of viscous material at a substantially constant [level] height and to increase the effective exposed surface of viscous material.

32. (Amended) The apparatus of claim 27, wherein said at least one second mechanism is configured to use [uses] the surface tension of the viscous material to control surface area and thickness of the viscous material available for application to said at least one semiconductor component.